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Application No. 10/715,314
Filed: November 17, 2003
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This listing of the claims replaces all prior versions in the application.

Listing of Claims:

1. (Original) A polishing apparatus comprising:
a rotatable turntable having a polishing pad;
a carrier head configured to cooperate with the polishing pad to hold a target workpiece to be polished in alignment with the polishing pad on the turntable; and
a magnetic field control unit comprising a plurality of spaced apart first magnetic field sources disposed inside the carrier head, for generating respective first magnetic forces, and a plurality of second magnetic field sources disposed inside the carrier head configured to generate respective second magnetic forces, a respective one of the plurality of second magnetic field sources being substantially spatially aligned with a respective one of the first magnetic field sources to define a magnetic field source pair, each magnetic field source pair being spaced apart from the others, wherein, in operation, the second magnetic field source in each magnetic field source pair is configured to selectively repel or attract the first magnetic field source.
2. (Original) The apparatus according to claim 1, wherein the first magnetic field sources each comprise at least one permanent magnet, and wherein the second magnetic field sources each comprise an electromagnet.
3. (Original) The apparatus according to claim 1, wherein the first magnetic field sources are held lower in the carrier head than the second magnetic field sources, with the second magnetic field source for each magnetic field source pair being positioned axially aligned with and above the corresponding first magnetic field source.
4. (Original) The apparatus according to claim 1, wherein the second magnetic field sources reside lower in the carrier head than the first magnetic field sources, with the first magnetic field source for each magnetic field source pair being positioned axially aligned with and above the corresponding second magnetic field source.

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5. (Original) The apparatus according to claim 1, wherein the first magnetic field sources are substantially concentrically aligned with: a center permanent magnet; an intermediate permanent magnet surrounding an outer peripheral edge of the center permanent magnet; and an outer permanent magnet surrounding an outer peripheral edge of the intermediate permanent magnet, and wherein the second magnetic field sources are substantially concentrically aligned with a center electromagnet; an intermediate electromagnet arranged to surround an outer peripheral edge of the center electromagnet; and an outer electromagnet arranged to surround an outer peripheral edge of the intermediate electromagnet.

6. (Original) The apparatus according to claim 5, wherein an insulating material, film and/or coating is positioned between adjacent magnetic field source pairs to substantially magnetically insulate the different magnetic field pairs from each other.

7. (Original) The apparatus according to claim 1, further comprising:
a polishing film thickness detector unit with a plurality of spaced apart sensors positioned proximate a polishing surface of the target workpiece for detecting a thickness of a polishing film of the target workpiece, the polishing film thickness detector unit operatively associated with the magnetic field control unit; and
a magnetic force adjustment unit configured to selectively control the polarity and/or magnetic force generated by each of the second magnetic field sources responsive to the detected thickness of the polishing film provided by the polishing film thickness detector unit.

8. (Withdrawn) A polishing method using a carrier head configured to house a first magnetic field source and a second spatially aligned magnetic field source, comprising:
generating a repellant or attractant magnetic force between the first and second magnetic field sources;

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rotating a turntable that is cooperably aligned with the carrier head, with an object to be polished positioned therebetween, in a predetermined direction, with the carrier head configured to apply pressure against the object in a direction toward the turntable; and

controlling the pressure applied to the object by the carrier head using the generated repellant or attractant magnetic forces.

9. (Withdrawn) A method according to claim 8, wherein the second magnetic field source comprises an electromagnet and the first magnetic field source comprises a permanent magnet.

10. (Withdrawn) A method according to claim 9, further comprising adjusting current delivered to the electromagnet to control the intensity or strength of the generated repellant or attraction magnetic field force.

11. (Withdrawn) A method according to claim 8, further comprising changing the current flow direction in the electromagnet to generate the desired attractant or repellant magnetic field force.

12-38 (Canceled)